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CENTRAL INTELLIGENCE AGENCY
INFORMATION FROM
FOREIGN DOCUMENTS OR RADIO BROADCASTS

REPORT
CD NO.

50X1-HUM

COUNTRY USSR

SUBJECT Scientific - Metallurgy

HOW PUBLISHED Monthly periodical

WHERE PUBLISHED Moscow

DATE PUBLISHED Sep 1948

LANGUAGE Russian

DATE OF INFORMATION 1948

DATE DIST. 4 Apr 1950

NO. OF PAGES 2

SUPPLEMENT TO REPORT NO.

THIS IS UNEVALUATED INFORMATION

SOURCE Nauka i Zhizn', No 9, 1948,

50X1-HUM

OXYGEN IN METALLURGY

Engr M. A. Veksler

The oxygen industry of the USSR reached its present state of healthy development only during the Soviet era. By 1938, the Soviet Union occupied the first place in Europe as a producer of oxygen, and such is the rate of our development in this technical field that it will doubtless occupy the first place in the world in the near future.

Given large quantities of cheap oxygen, it is natural that the problem of improving many technological and, in particular, metallurgical processes should acquire great importance in the national economy.

At the 18th Party Conference, Lazar' Moiseyevich Kaganovich said: "We must step up the smelting of pig iron. But, must this be done only by building new metallurgical plants which cost billions? We can obtain vast additional amounts of pig iron by using oxygen blasts in the blast-furnace process."

Efforts to speed up the process with the aid of ordinary air led to unwelcome phenomena. But when the air was enriched with oxygen, the output of the blast furnace was nearly doubled while the consumption of coke decreased. These indexes were obtained for a blast furnace in one of our plants.

Oxygen-blast processes have likewise facilitated the solution of other important problems. For example, in addition to pig iron, a blast furnace produces many gases which are utilized as fuel in metallurgical plants. But blast-furnace gas is a poor fuel and, to be successfully applied, must be mixed with other, more calorific, gases. Theoretical computations and experimental data prove that in order to obtain high-quality blast-furnace gas, it is necessary to employ enriched air and also to replace coke with another raw material containing combustible gases.

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Engineer A. P. Vavilov made the first experiments along these lines in the 1920's. He charged a blast furnace with peat -- a cheap, lean fuel, of which there are immense reserves in our country. Vavilov worked with ordinary air and proved that standard-quality pig iron could be produced, even with peat. Nine years later, these experiments were repeated with the cooperation of the Academy of Sciences USSR, and they corroborated Vavilov's conclusions. Together with the pig iron, a higher quality blast-furnace gas was produced.

In 1938, in a plant under the management of V. V. Kondakov, Candidate of Technical Sciences, the first blast furnace in the Soviet Union operating on peat and oxygen blasts, was blown in. The combination of these two factors made it possible to employ peat in smelting special pig iron as well as ordinary types. Moreover, blast-furnace gas, with a high heating value, was obtained which could be subjected to further processing and transported to other firms, as well as to cities for lighting purposes. With a reduction in the price of peat, blast-furnace gas could compete successfully even with natural gas.

It has been calculated that one blast furnace of large capacity can replace 80 very large gas generators in which so-called illuminating gas is processed. It should be noted that during the coking of peat, a resin is isolated which is a valuable raw material for the chemical industry. The peat-oxygen process has a great future.

The work of Soviet engineers has demonstrated that certain drawbacks in the converter method can be eliminated by introducing oxygen blasts. The credit for the first use of oxygen in our country belongs to Engineer N. I. Mozgov. He first obtained steel by blasting molten pig iron with oxygen in an experimental installation in 1934.

The immediate task for metallurgists, refractory specialists, and designers is to transform the converter-smelting process into an oxygen-blast process on an industrial scale.

The use of oxygen also promises great advantages in the most widely used method of producing steel -- the Martin process. It will increase the output of the Martin furnace by 12-17 percent and lower the outlay of refractories. Moreover, the use of oxygen will reduce the cost of furnace construction since there will be no further need for complicated and cumbersome air preheaters.

Soviet oxygen metallurgy holds an honorable place in the postwar Five-Year Plan.

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